PATENT SPECIFICATION

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(54) ARTICLE OF FURNITURE USABLE AS A CHAIR

(71) We UNIROYAL PTY. LTD., a Company incorporated under the laws of the State of South Australia, Commonwealth of Australia, of 1028 South Road, Edwardstown, State of South Australia, Commonwealth of Australia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an article of furniture usable as a chair wherein a hollow container is partly filled with beads which are non-adherent and which freely move within the container to accommodate a position imposed by a load placed on the exterior walls of the container.

Among previously proposed furniture of the above type there have been provided spherical or almost spherical containers wherein the container retains a plurality of beads (usually polystyrene), and when a user sits in the upper portion of the container the upper portion becomes indented, and the polystyrene beads flow to occupy a position wherein there is some degree of support to a user.

With the previously proposed articles of the type described, several difficulties have been encountered. Firstly polystyrene is itself not a cushioning material and is most abrasive on the interior surface of fabric if fabric is employed. Thus only the top quality fabric can be used if a satisfactory article of furniture is to be made, and the cost is very great. In the alternative, fabric coated with a polyvinyl chloride may be used for its superior mechanical strength, but polyvinyl chloride is not a popular material for upholstery purposes because of its non-absorbent surface which is uncomfortable to the touch. A still further problem is that there is insufficient hysteresis in the cover to maintain a shape once it has been formed, and if a user moves his body the cover will tend to move even though the body movement might be very small.

Also among previously proposed furniture there has been furniture formed from a slab of thick foam material (as described in U.S. Patent No. 3,678,553 (Hermelin)), and hollow foam material (as described in the Cashen U.S. Patent No. 3,476,497). However furniture produced in this way is also subject to the disability of absence of "support". A feeling of insecurity is apparent to a user when there is very little resistance to movement, and once again the objection can be traced to insufficient hysteresis, that is, insufficient resistance to further deformation.

The invention resides in the inclusion within a hollow body of beads which are free-flowing and non-adherent, the walls being of thick foam material. When the walls are deformed, as by a user sitting in a chair, the beads flow into the spaces at the localities of folds in the foam material, and so deform the foam material that movement is inhibited and considerably more comfort is imparted than in either of the other two types of furniture referred to.

Specifically, the present invention provides an article of furniture usable as a chair comprising a hollow shell which at least approximates a spheroid or part spherical shape and which is of polyurethane foam at least one inch in thickness, and free flowing non-adherent beads contained inside the shell and occupying between one quarter and two thirds the volume of the hollow interior.

It is found that with this invention not only does the furniture tend to retain the shape it occupies when a user indents portion of the shell but also use may be made of relatively inexpensive but highly desirable fabrics for upholstery material surrounding the foam shell. Further, the foam in being doubled over at the locality of the indent forms arms for supporting a user with considerable comfort, and the foam functions satisfactorily as a cushion, evenly spreading the load from the user onto the supporting beads.

Two embodiments of the invention are described hereunder in some detail with reference to and are illustrated in the accompanying drawings, in which:

Fig. 1 is a section through an article of furniture usable as a chair and in accordance with the invention,

Fig. 2 is a section similar to Fig. 1 but showing the article of Fig. 1 deformed as when in use, and

Fig. 3 is an elevation of an article of furniture usable as a chair and according to a second embodiment.

In the embodiment of Figs. 1 and 2 a hollow foam shell 10 is formed from two hemispherical portions which are joined together across an equitorial plane by a layer of adhesive 11. Each portion is formed from a polyurethane foam by a cold curing process, the thickness of the polyurethane foam being at least one inch, and in this embodiment about two inches. The thickness will depend to some extent on the density of the foam and its elastomeric properties.

It is important in this invention that the foam should have a suitable density, which for best results should be between 30 and 50 KG/M³, and also a minimum elongation of 120%. The mixture selected satisfies the following specification:

Density	40 KG/M³ Min.	ASTM	D2406
Tear Strength	1.5 lb./inc Min.	ASTM	D2406
Tensile Strength	12 p.s.i. Min.	ASTM	D2406
Elongation	150% Min.	ASTM	D2406
Dry heat aging:	22 hours at 140°C.		
Tensile Strength	75% Min. orig. value	ASTM	D2406
Compression set:	50% 10% max.	ASTM	D2406
	75% 10% max.	ASTM	D2406
Humid Aging:			
Autoclave 5 hours			
121°C. Cld. 80% – 120% orig. value		ASTM	D2406
Compression set 50% – 30% max.		ASTM	D2406
	75% – 30% max.	ASTM	D2406

Flammability Motor Vehicle Safety Standard No. 302

(ASTM: The American Society for Testing and Materials)

The above characteristics can be obtained, for example, from a formulation recommended by the Bayer Aktiengesellschaft, of Leverkusen, Germany. The designations in the formulation are designations or Trade Marks of Bayer:

Desmophen UP.	PU3099	50.00	Parts by weight
Desmophen UP.	DD3063	50.00	Parts by weight
Water		2.70	Parts by weight
Solid Dabco		0.15	Parts by weight
N-methylmorpholine		0.80	Parts by weight
Catalyst Al		0.08	Parts by weight
DBTDL		0.03	Parts by weight
Stabiliser DD3043		1.00	Parts by weight
Stabiliser B2909		0.10	Parts by weight
Desmodur UP PU3100		33.80	Parts by weight

The above specification was obtained with a cold cure mix, and a characteristic of cold cure mixes is that they form a skin which is of higher density than the remainder of the foam.

However, before the two hollow hemispherical portions are cemented together, the inner space defined by one of them is at least partly filled so that after cementing at least one quarter but less than two thirds of the space within the ball contains beads. The beads selected in this embodiment are beads of polystyrene and are arranged in size from about 2 mm. diameter to about 6 mm. diameter.

For its outer covering, the shell is provided with an upholstery material 14 formed from a series of segments sewn together, but having a slit containing a sliding clasp fastener 15, which enables the cover to be quickly and easily positioned over the shell and retained in position. In this embodiment the cover used is a knitted synthetic polyester sold under the Registered Trade Mark "Terylene". However wool or other suitable fabrics may be used if preferred.

As shown in Fig. 2, the shell shape changes when an occupant sits on the article. The effect of the beads 12 is to form a large number of indentations in the skin which forms the inner surface of the shell, and this inhibits but does not prevent relative sliding movement, with the result that the occupant feels as though he is more effectively supported than if no beads are used.

The second embodiment of Fig. 3 illustrates an alternative configuration, wherein the shell 10 is of truncated spherical form with two circular planar portions 20 but is otherwise similar to the first embodiment. This arrangement functions in much the same manner as in the first embodiment, but is more readily usable by an occupant.

It will of course be realised that the outer covering of upholstery material 14 may be formed as a unitary sewn cover or further as a removable cover incorporating suitable fastening means which allows the cover to be removed from the shell.

It will be appreciated that although spherical and part spherical shell shapes have been shown, it is not necessary that the shells of the articles of the invention be exactly spherical or part spherical as long as they approximate shell shapes. In any event, with use, the articles will tend to become slightly mis-shapen.

WHAT WE CLAIM IS:—

1. An article of furniture usable as a chair comprising a hollow shell which at least approximates a spherical or part spherical shape and which is of polyurethane foam at least one inch in thickness, and free-flowing non-adherent beads contained inside the shell and occupying between one quarter and two thirds the volume of the hollow interior.

2. An article of furniture according to claim 1, wherein the shell is of truncated spherical form and includes at least one planar portion.

3. An article of furniture according to claim 1 or 2, further comprising an outer cover of fabric having a sliding clasp fastener closing an opening in said cover.

4. An article of furniture according to claim 1, 2 or 3 wherein said polyurethane foam shell comprises two similar portions joined with a layer of adhesive in an equitorial plane.

5. An article of furniture according to any preceding claim, wherein said polyurethane foam has a density of between 30 and 50 KG/M^3, and a minimum elongation of 120%.

6. An article of furniture according to any preceding claim, wherein said beads are beads of polystyrene varying in size between 2 mm. and 6 mm. diameter.

7. An article of furniture usable as a chair, substantially according to the embodiments described in the specification with reference to and as illustrated in the accompanying drawings.

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1 SHEET

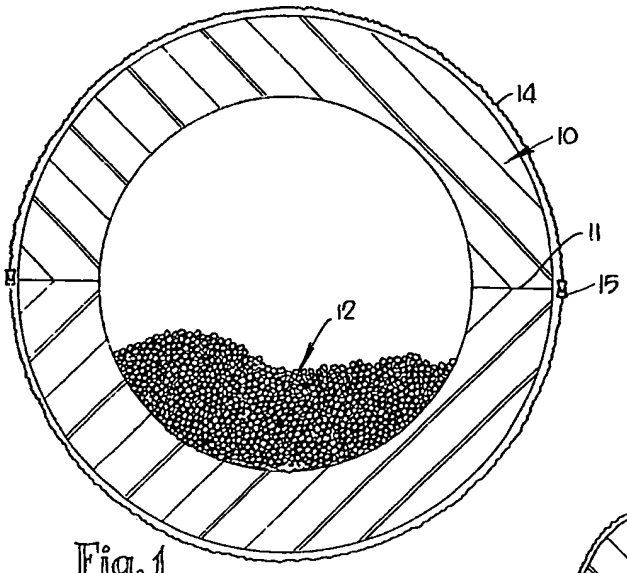

Fig. 1

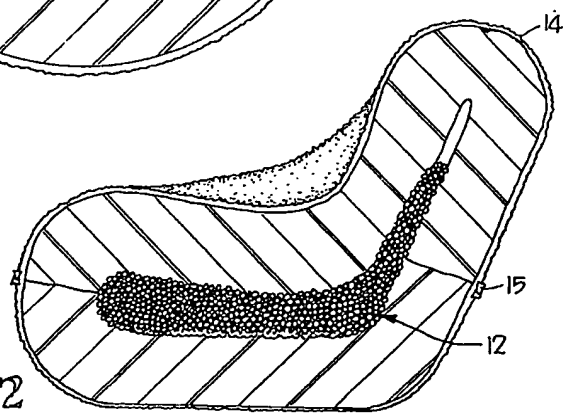

Fig. 2

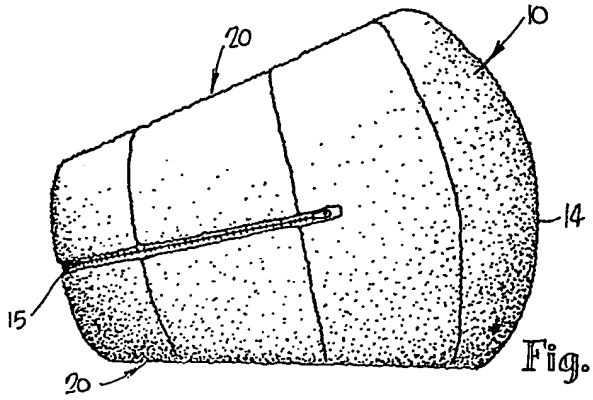

Fig. 3